

PATENT ABSTRACTS OF JAPAN

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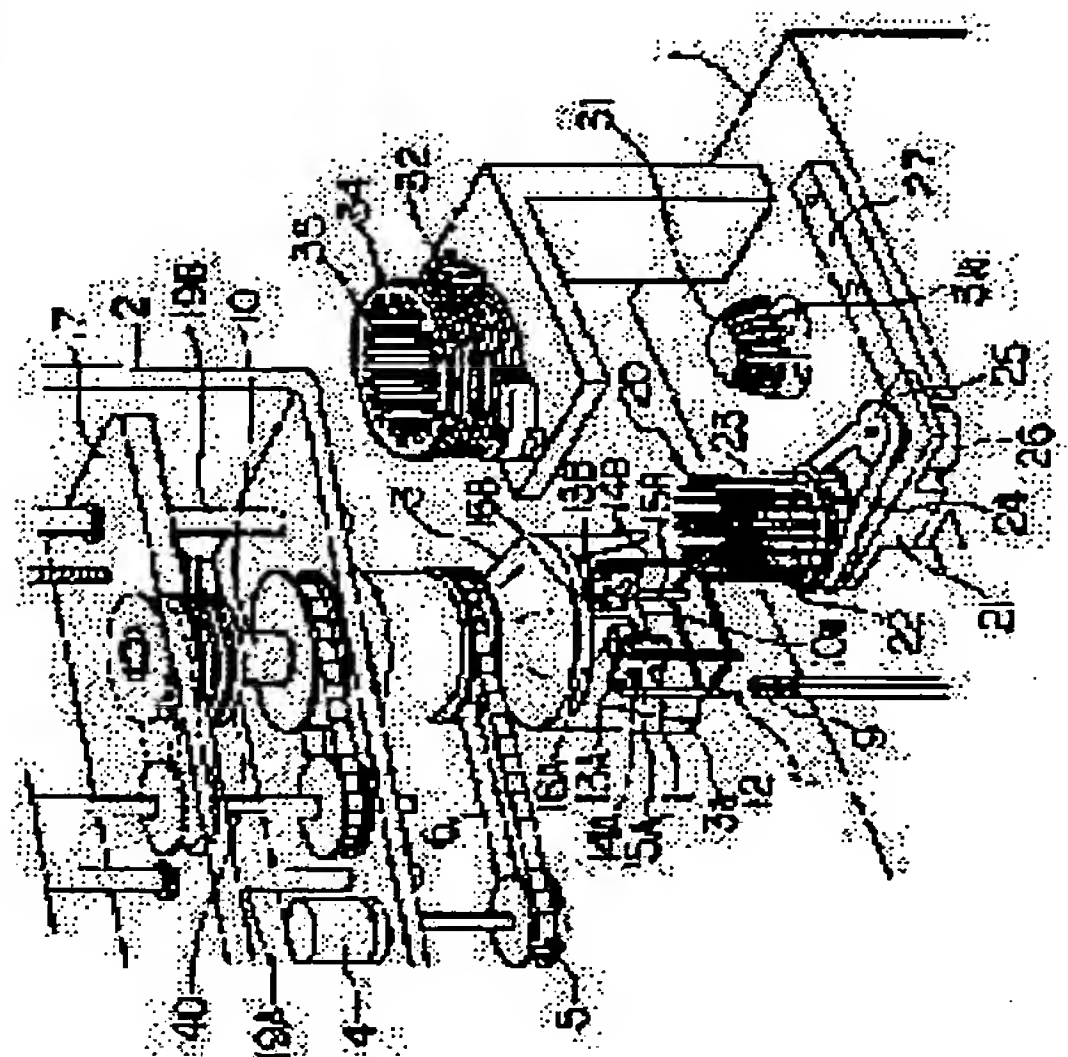
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(54) WINDING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a winding device at a low cost which can easily cope with adjustment of a coil winding diameter corresponding to an installation part position in a stator and changes of a stator form and coil specification and manufacture a coil excellent in characteristic, in the winding device for manufacturing a coil by installing wound wire in a slot of a stator.

SOLUTION: In this winding device, a guide shaft 12 is installed on the lower end side of a shaft member 10 arranged on the center axis of a flyer 11. A winding frame is constituted of winding frame pins 14A, 15A, 14B, 15B fixed to movable plates 13A, 13B which can move along the guide shaft 12. By moving the movable plates 13A, 13B with motors 16A, 16B, the winding frame diameter can be continuously changed.



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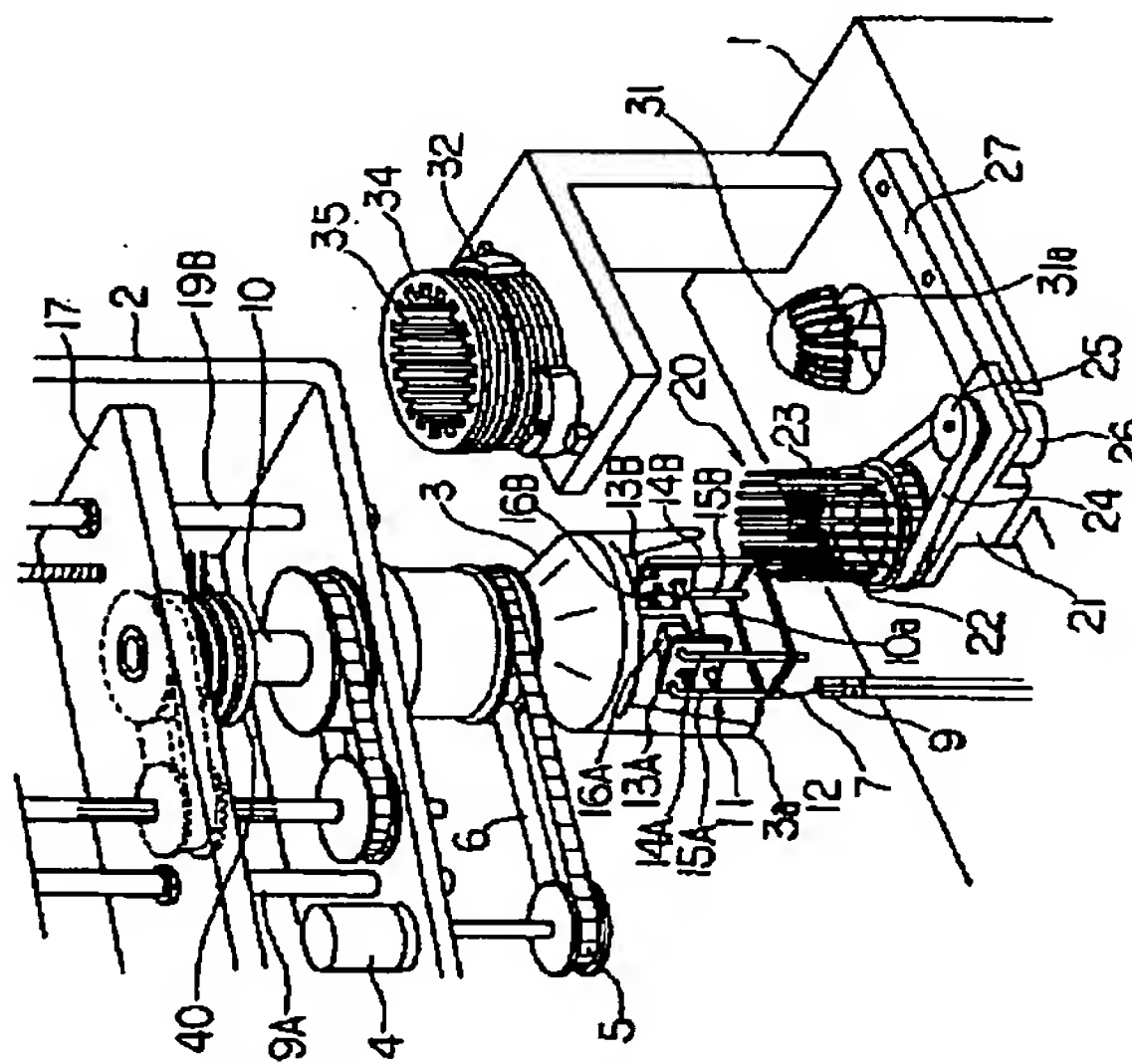
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QQ26 QQ27

(54) 【発明の名称】 巻線装置

(57) 【要約】

【課題】 巻線された線材をステータのスロットに装着してコイルを製造する巻線装置において、ステータ内の装着部位に対応したコイル巻径の調整や、ステータ形状やコイル仕様の変更への容易に対応でき、特性の優れたコイルを製造しうるものを低コストで提供する。

【解決手段】 フライヤ11の中心軸上に配置された軸部材10の下端側にガイド軸12を備え、このガイド軸12に沿って移動可能な移動板13A、13Bに固定された巻枠ピン14A、15A、14B、15Bにより巻枠を構成し、移動板13A、13Bをモータ16A、16Bにより移動させることにより、巻枠径を連続的に変更可能とする。



て電源と接続されるとともに、前記線材は前記スリップリング上下にを貫通する貫通路を通して前記フライヤの線材繰り出し部に供給される。

【0011】

【発明の作用および効果】第1の発明によれば、巻枠径変更手段により巻枠の径を連続的に変更することができるので、巻径（コイル径）をステータの装着部位に対応するサイズに調整しつつ巻線し、ブレードに巻き落とすことができる。したがって、装着された線材はステータのスロットに適切にぴったり収容されるので、コイルの占積率が向上し、良質なコイルを製造できる。また、ステータの上下に余分な線材が突出することがないので、コイルエンド部の成型が容易になるとともに、コイルに無駄な部分がない分、コイルの特性が向上する。また、線材をステータに装着するときにはスムーズに装着することができる。また、巻枠径の連続的な変更により、ステータ形状やコイル仕様の任意の変更に対しても、容易に対応することができる。

【0012】第2の発明によれば、巻枠は、複数の支持部材のそれぞれに巻枠ピンを固定して構成されるので、簡素な構成で軽量コンパクトに構成できる。また、巻枠径変更手段は、複数の支持部材を相対的に移動させる手段とすればよく、支持部材を移動させるモータ等で低コストで容易に構成できるとともに、巻枠径の管理は支持部材の移動量に基づいて行いうる。さらに、巻枠形状の設定は、巻枠ピン相互の配置を変えることにより、容易に自由な変更を行い得る。

【0013】第3の発明によれば、巻枠径変更手段はガイド軸と一対のモータとからなるので、巻枠径変更手段は低コストで構成できるとともに、巻枠径の調整はモータ制御により高精度に行いうる。

【0014】第4の発明によれば、モータへの電力供給はスリップリングおよび軸部材中空部に設けられた配線を介してなされるので、巻線装置の構成を複雑にすることがないとともに、線材はスリップリングを上下に貫通する貫通路を介して供給されるので、フライヤが回転した場合でも線材はモータへの配線と干渉することはない。

【0015】

【発明の実施の形態】以下、添付図面に基づいて、本発明の実施の形態について説明する。

【0016】図1、図2には、本実施の形態の巻線装置の全体構成を示す。

【0017】図示されるように、巻線装置の基台1上方に延設された支持フレーム2には、先端側を下方に向けた筒型のフライヤ3が、軸受を介して回転自在に支持される。このフライヤ3は、ブリー5およびベルト6を介して、駆動モータ4と連結され、軸回りで回転駆動されるようになっている。なお、本実施の形態では、フライヤ3の回転軸は垂直方向を向いているが、フライヤ3の

回転軸の方向は任意であり、例えば水平方向を向けてもよい。

【0018】線材7は、図示されない線材供給源から同じく図示されないテンション装置を経て供給される。そして線材7は、支持フレーム2に固定された案内ブリー8（あるいはセラミックノズル）を経て、フライヤ3に形成された線材案内通路3bを通して案内され、フライヤ3の線材繰り出し部3aから繰り出される。ここで、線材繰り出し部3aは、フライヤ3の下端側に延設された部分であり、フライヤ3の回転軸（中心軸）から所定距離だけ離れた位置に配置されている。線材繰り出し部3aから繰り出された線材7の端部は、フライヤ3の下方に配置された線材把持機構9により把持される。

【0019】フライヤ3の略中心軸上には、軸方向に移動可能な軸部材10が、回転不能に配設される。この軸部材10の下端側には巻枠機構11が支持され、線材繰り出し部3aの側方に配設される。

【0020】巻枠機構11は、線材繰り出し部3aから繰り出された線材7が巻き付けられる巻枠を構成するものである。

【0021】詳しく説明すると、巻枠機構11は、軸部材10下端のフランジ部10aの両側に、一対の移動板13A、13Bを備える。これらの移動板13A、13Bは、このフランジ部10aを貫通して水平に固定されたガイド軸12に移動自在に支持されるとともに、それぞれボールねじを構成するモータ16A、16Bの出力軸に連結されており、モータ16A、16Bの駆動により移動して、互いの間隔を変更できるようになっている。

【0022】移動板13Aには巻枠ピン14A、15Aが、また移動板13Bには巻枠ピン14B、15Bが、それぞれ並列に下方に垂下された状態で固定される。これにより、巻枠ピン14A、15A、14B、15Bは、四角形の4つの頂点上に位置するように配置される。線材繰り出し部3aから繰り出された線材7は、これら4本の巻枠ピン14A、15A、14B、15Bの形作る四角形の巻枠外側に巻回される。

【0023】この場合、前述したように移動板13Aと13Bの間隔を変更することができるので、巻枠ピン14A、15A、14B、15Bの形作る四角形の大きさ、すなわち巻枠の径は連続的に変更することができる。そして、この巻枠径の調整は、移動板13Aと13Bの移動量に基づいて、モータ16A、16Bの制御により行いうるので、容易に高精度なものとなる。

【0024】軸部材10の上端側は、軸受を介して昇降板17に回転自在に支持される。この昇降板17は、駆動モータ18の駆動により、支持フレーム2に鉛直方向に延びて備えられたガイド軸19A、19Bに沿って昇降可能となっている。これにより、軸部材7はフライヤ3に対して上下に移動し、巻枠機構10の巻枠ピン14

材7を順次ブレード23に巻き落としていく。これにより、ブレード23には、上層に行くほど巻径が小さくなるように、巻線された線材7が複数層（本実施の形態では3層）積層された状態となる。詳しくは、最下層のコイルはブレード23の5本の針に跨って掛け回される大径のコイルとなり、中間層のコイルは3本の針に跨って掛け回される中径のコイルとなり、最下層のコイルは1本の針に掛け回される小径のコイルとなる。

【0040】なお、このように本実施の形態では巻枠径の変更をコイル各層の巻線毎に行うようにしているが、本発明はこのような形態に限られるものではなく、例えば、巻枠径の変更をコイル各層の巻線の途中で行い、コイル各層内でコイル径を細かく変えるような形態を採ることもできる。

【0041】このようにしてブレード23の所定位置へ巻き落とされるべき線材の巻線および巻き落としが終了したら、図8に示すようにブレード機構20の基部22を所定角度（例えば90度）回転させ、ブレード23の新たな巻き落とし位置を巻枠機構11の下方に配置する。この状態で、上記と同様の手順で巻線、巻き落としおよび巻径の変更を順次行っていくことにより、ブレード23の新たな巻き落とし位置に線材7を積層状態で巻き落としていく。

【0042】このような手順の繰り返しにより、図9に示すようにブレード23の全周に渡って線材7が巻き落とされたら、ブレード機構20をコイル挿入子31の上方かつステータ支持部32の下方に移動する。この状態で、コイル挿入子31を基部22の環状穴の間からせり上がらせる。

【0043】これにより、図10、図11に示すように、ブレード23に巻き落とされていた線材7が、コイル挿入子31によりブレード23から押し上げられ、ステータ支持部32に支持されたステータ34内部に押し込められていく。

【0044】この場合、ブレード23に巻き落とされている線材7の各層の径は、上述したように、ステータ34の装着部に正しく対応した大きさに調整されているので、ステータ34の各スロット35にスムーズにされて行く。具体的に説明すると、例えば図12に示すように、ステータ34に巻線された線材7（コイル）を装着する場合、コイルの第1層（最上層）7aは隣り合うスロット35a、35bに挿入され、コイルの第2層（中間層）7bはスロット35a、35bの両側のスロット35c、35dに挿入され、コイルの第3層（最下層）7cはスロット35c、35dの両側のスロット35e、35fに挿入されるが、コイルの各層7a、7b、7cは予めスロット35aと35b、35cと35d、35eと35fの間隔に相当する径に巻線されており、ステータ34への線材7の装着は極めてスムーズに行われる。

【0045】また、装着されたコイルの各層7a、7b、7cは重なり合うことがないので、完成したコイルの占積率が向上する。また、コイルの各層7a、7b、7cはステータ34のスロット35にぴったり装着され、余分な線材7がステータ34の上下に突出することがないので、コイルエンド部の成型が容易になるとともに、コイルに無駄な部分がなくなり、コイル特性（完成したコイルを用いたモータの特性）が向上する。

【0046】このようにしてステータ34への線材7の装着が終了したら、コイル挿入子31を下降させて、巻線作業が終了する。

【0047】以上のように、本発明の巻線装置によれば、巻枠機構11の巻枠径を連続的に調整することができるので、ステータ34の形状に合わせてコイルの巻径を適切に変更していくことができるので、ブレード23に巻き落とされたコイルはステータ34内に無駄なくスムーズに挿入され、占積率の大きな良質なコイルを製造できる。

【0048】また、コイルの巻径は巻線機構11の巻枠径の変更により連続的に自由に変更できるので、ステータ34の形状の変更やコイルの仕様変更に対応することができる。

【図面の簡単な説明】

【図1】本発明の実施の形態を示す巻線装置の斜視図である。

【図2】同じく断面図である。

【図3】同じく一部断面図である。

【図4】同じくスリッリングを示す斜視図である。

【図5】同じく巻線手順を示す説明図である。

【図6】同じく巻線手順を示す説明図である。

【図7】同じく巻線手順を示す説明図である。

【図8】同じく巻線手順を示す説明図である。

【図9】同じく巻線手順を示す説明図である。

【図10】同じく巻線手順を示す説明図である。

【図11】同じく巻線手順を示す説明図である。

【図12】同じく巻線手順を示す説明図である。

【符号の説明】

3 フライヤ

7 線材

10 軸部材

11 巻枠機構

12 案内軸

13A、13B 移動板

14A、14B 巻枠ピン

15A、15B 巻枠ピン

16A、16B モータ

20 ブレード機構

21 支持台

22 基部

50 23 ブレード

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CLAIMS

[Claim(s)]

[Claim 1] The winding frame around which the wire rod which it has been adjacently arranged in the wire rod delivery section of a pivotable flyer and this flyer at the circumference of a shaft, and let out from the wire rod delivery section is wound, Coil equipment characterized by having a diameter modification means of a winding frame to change the path of said winding frame continuously, in coil equipment equipped with the blade by which the wire rod wound around this winding frame is rolled over, and a wearing means to make a stator equip with the wire rod rolled over by this blade.

[Claim 2] It is coil equipment according to claim 1 characterized by being the means to which said diameter modification means of a winding frame moves said two or more supporter material relatively while said winding frame consists of two or more winding frame pins fixed to two or more supporter material.

[Claim 3] While said two or more supporter material is the migration plates of a couple, arranging shank material to revolution impossible on the abbreviation medial axis of said flyer and arranging the migration plate of said couple on both sides of this shank material Said diameter modification means of a winding frame is equipped with the guide shaft which intersects perpendicularly with said shank material, and the motor of the couple prepared corresponding to each migration plate. Coil equipment according to claim 2 characterized by making each migration plate movable in accordance with said guide shaft by connecting the output shaft which constitutes the ball screw of these motors with the migration plate which corresponds, respectively.

[Claim 4] It is coil equipment according to claim 3 characterized by supplying the wire rod delivery section of said flyer through the gangway where said wire rod penetrates said slip ring ***** while said shank material is equipped with a centrum, equipping the periphery of said shank material with said flyer and the slip ring which rotates synchronous and connecting said motor with a power source through wiring arranged in the centrum of said slip ring and said shank material.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to amelioration of the coil equipment which equips the slot of a stator with the wire rod by which the coil was carried out, and manufactures a coil.

[0002]

[Description of the Prior Art] There are some which hold the wire rod by which the coil was carried out in a motor stator side iron core (stator), and are formed in it as a coil for motors. The wire rod which rolled over to the blade the wire rod (coil) wound around the surroundings of a winding frame as coil equipment which manufactures such a coil, and was rolled over by this blade is inserted in the proposal by the slot of stator ** at JP,62-77038,A and JP,62-182058,U.

[0003]

[Problem(s) to be Solved by the Invention] However, there is a trouble which is described below in these winding machines.

[0004] That is, with this winding machine, although the winding machine of JP,62-770038,A leads the coil wound around the surroundings of a winding frame to a blade with a migration means and carries out sequential wearing of this coil to the predetermined wearing part of a stator core, since the path of a winding frame is fixed, the path of a coil does not necessarily suit the size of the wearing part of a stator core. For this reason, while the space factor of the coil with which the stator core was equipped fell, the form of the completed coil was confused and there was a trouble of being hard to carry out molding of a coil.

[0005] The winding machine of JP,62-182058,U enables it to change a wound diameter gradually on the other hand by having a winding frame with a stair-like configuration in consideration of this trouble, and making a coil each of this stage. However, in this winding machine, while the configuration of a winding frame will become complicated, when only that by which the winding frame was gradually equipped also with the wound diameter of a coil can be chosen, for example, the configuration of a stator is changed, it cannot respond.

[0006] This invention can perform easily the response to modification of adjustment of a coil wound diameter, a stator configuration, and a coil specification corresponding to the wearing part in a stator in the coil equipment which was made paying attention to such a trouble, equips the slot of a stator with the wire rod by which the coil was carried out, and manufactures a coil, and aims at offering by low cost what can manufacture the coil which was excellent in the property.

[0007]

[Means for Solving the Problem] The winding frame around which the wire rod which it has been adjacently arranged in the wire rod delivery section of a pivotable flyer and this flyer in the 1st invention at the circumference of a shaft, and let out from the wire rod delivery section is wound, In coil equipment equipped with the blade by which the wire rod wound around this winding frame is rolled over, and a wearing means to make a stator equip with the wire rod rolled over by this blade, it had a diameter modification means of a winding frame to change the path of said winding frame continuously.

[0008] In the 2nd invention, while said winding frame consists of two or more winding frame pins fixed to two or more supporter material, said diameter modification means of a winding frame is a means to which said two or more supporter material is moved relatively.

[0009] While said two or more supporter material is the migration plates of a couple, arranging shank material to revolution impossible on the abbreviation medial axis of said flyer in the 3rd invention and arranging the migration plate of said couple on both sides of this shank material Said diameter modification means of a winding frame was equipped with the guide shaft which intersects perpendicularly with said shank material, and the motor of the

couple prepared corresponding to each migration plate, and made each migration plate movable in accordance with said guide shaft by connecting the output shaft which constitutes the ball screw of these motors with the migration plate which corresponds, respectively.

[0010] In the 4th invention, said shank material is equipped with a centrum, the periphery of said shank material is equipped with said flyer and the slip ring which rotates synchronous, and while said motor is connected with a power source through wiring arranged in the centrum of said slip ring and said shank material, said wire rod is supplied to the wire rod delivery section of said flyer through the gangway which penetrates said slip ring *****.

[0011]

[Function and Effect of the Invention] According to the 1st invention, since the path of a winding frame can be continuously changed with the diameter modification means of a winding frame, a coil can be carried out adjusting a wound diameter (coil diameter) to the size corresponding to the wearing part of a stator, and it can roll over to a blade. Therefore, since the wire rod with which it was equipped is held exactly suitable for the slot of a stator, the space factor of a coil improves and a good coil can be manufactured. Moreover, since the excessive wire rod of a stator does not project up and down, while molding of a coil and the section becomes easy, the property of the part which does not have a useless part in a coil, and a coil improves. Moreover, when equipping a stator with a wire rod, it can equip smoothly. Moreover, it can respond easily also to modification of the arbitration of a stator configuration or a coil specification by continuous modification of the diameter of a winding frame.

[0012] According to the 2nd invention, since a winding frame fixes a winding frame pin to each of two or more supporter material and is constituted, it can consist of simple configurations in a lightweight compact. Moreover, while it is good and the means to which two or more supporter material is moved relatively, then the motor to which supporter material is moved can constitute the diameter modification means of a winding frame from low cost easily, management of the diameter of a winding frame can be performed based on the movement magnitude of supporter material. Furthermore, setting out of a winding frame configuration can make a free change easily by changing arrangement between winding frame pins.

[0013] Since the diameter modification means of a winding frame consists of a guide shaft and a motor of a couple, while being able to constitute the diameter modification means of a winding frame from low cost according to the 3rd invention, motor control can perform adjustment of the diameter of a winding frame to high degree of accuracy.

[0014] Since a wire rod is supplied through the gangway which penetrates the slip ring up and down while not complicating the configuration of coil equipment, since the electric power supply to a motor is made through wiring prepared in the slip ring and a shank material centrum according to the 4th invention, even when a flyer rotates, it does not interfere in a wire rod with wiring on a motor.

[0015]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on an accompanying drawing.

[0016] The whole coil equipment configuration of the gestalt of this operation is shown in drawing 1 and drawing 2.

[0017] The telescopic flyer 3 which turned the head side caudad is supported free [a revolution] through bearing by the support frame 2 installed in the pedestal 1 upper part of coil equipment so that it may be illustrated. Through a pulley 5 and a belt 6, this flyer 3 is connected with a drive motor 4, and revolution actuation is carried out by the circumference of a shaft. In addition, with the gestalt of this operation, although the revolving shaft of a flyer 3 is perpendicularly suitable, the direction of the revolving shaft of a flyer 3 is arbitrary, for example, may turn horizontally.

[0018] A wire rod 7 is supplied through the tension device which similarly is not illustrated from the wire rod supply source which is not illustrated. and a wire rod 7 should pass the advice pulley 8 (or ceramic nozzle) fixed to the support frame 2 -- it shows around through wire rod advice path 3b formed in the flyer 3, and lets out from wire rod delivery section 3a of a flyer 3. Here, wire rod delivery section 3a is the part installed in the soffit side of a flyer 3, and is arranged in the location which only predetermined distance separated from the revolving shaft (medial axis) of a flyer 3. The edge of the wire rod 7 which it let out from wire rod delivery section 3a is grasped by the wire rod grasping device 9 arranged under the flyer 3.

[0019] On the abbreviation medial axis of a flyer 3, the shank material 10 movable to shaft orientations is arranged by revolution impossible. The winding frame device 11 is supported at the soffit side of this shank material 10, and it is arranged in the side of wire rod delivery section 3a.

[0020] The winding frame device 11 constitutes the winding frame around which the wire rod 7 which it let out

from wire rod delivery section 3a is twisted.

[0021] If it explains in detail, the winding frame device 11 will equip the both sides of flange 10a of shank material 10 soffits with the migration plates 13A and 13B of a couple. These migration plates 13A and 13B are connected with the output shaft of the motors 16A and 16B which constitute a ball screw, respectively, move by actuation of Motors 16A and 16B, and can change mutual spacing while they are supported free [migration on the guide shaft 12 which penetrated this flange 10a and was fixed horizontally].

[0022] The winding frame pins 14A and 15A are fixed to migration plate 13B by migration plate 13A again, after the winding frame pins 14B and 15B have hung caudad to juxtaposition, respectively. Thereby, the winding frame pins 14A, 15A, 14B, and 15B are arranged so that it may be located on four top-most vertices of a square. The wire rod 7 which it let out from wire rod delivery section 3a is wound around the winding frame outside of the square which these four winding frame pins 14A, 15A, 14B, and 15B form.

[0023] In this case, since spacing of the migration plates 13A and 13B can be changed as mentioned above, the magnitude of the square which the winding frame pins 14A, 15A, 14B, and 15B form, i.e., the path of a winding frame, can be changed continuously. And since control of Motors 16A and 16B can perform adjustment of this diameter of a winding frame based on the movement magnitude of the migration plates 13A and 13B, it can do with a highly precise thing easily.

[0024] The upper bed side of the shank material 10 is supported by the rise-and-fall plate 17 free [a revolution] through bearing. This rise-and-fall plate 17 can be gone up and down in accordance with the guide shafts 19A and 19B with which the support frame 2 was equipped by actuation of a drive motor 18 by extending in the direction of a vertical. Thereby, the shank material 7 can move up and down to a flyer 3, and can change now the location where the winding frame pins 14A, 15A, 14B, and 15B of the winding frame device 10 face wire rod delivery section 3a, i.e., the location where a coil is made by the winding frame pins 14A, 15A, 14B, and 15B.

[0025] The blade device 20 is arranged so that it may be located under the flyer 3 on a pedestal 1. This blade device 20 is equipped with the annular base 22 supported free [a revolution] and the blade 23 set up along this base 22 on susceptor 21. Here, a blade 23 puts in order two or more needles of the number decided according to the configuration (the number of magnetic poles, number of layers) of the stator 34 mentioned later at intervals of predetermined, and is constituted. The wire rod 7 by which the coil was carried out to the winding frame device 11 is rolled over on this blade 23 one by one.

[0026] Through a belt 24 and a pulley 25, the base 22 of this blade device 20 is connected with a motor 26, and revolution actuation is carried out. Thereby, angle of rotation of a blade 23 can be changed and a sequential change of the location (rolling over location) where a wire rod 7 is rolled over from the winding frame device 11 can be made now.

[0027] After having become movable along with the rail 27 and making dropping [wind] a wire rod 7 to a blade 23, the susceptor 21 of the blade device 20 is driven to the drive which is not illustrated, and moves under the coil insertion child's 31 upper part, and the stator supporter 32.

[0028] The coil insertion child 31 can go up and down by actuation of the rise-and-fall actuator 33 while having two or more height 31a which begins to be prolonged in the side in the location corresponding to between the needles of a blade 23. If this rises from between the annular holes of the base 22 arranged up, height 31a looked into through between the needles of a blade 23 can push up the wire rod 7 currently rolled over by the blade 23, and can push in the stator 34 interior supported by the stator supporter 32.

[0029] Moreover, a stator 34 is an annular member with gearing-like inner skin, and it is equipped with the wire rod 7 (coil) by which the coil was carried out to the slot 35 formed among each gearing (refer to drawing 11).

[0030] In addition, in case a stator 34 is equipped with a coil, it has the press member which pushes the wire rod 7 held in the slot 35, and may be made to cast a coil, although not shown in the gestalt of this operation so that a wire rod 7 may be thoroughly pushed in in a slot 35.

[0031] Moreover, although it was made to push up to holding a coil in a stator 34 by the coil insertion child 31, this invention is not restricted to such a gestalt, and is equipped with a hook member, for example, pulls up a coil by this hook member, and you may make it hold it in a stator 34 with the gestalt of this operation as mentioned above.

[0032] The electric wiring to the motors 16A and 16B of the winding frame device 11 is shown in a detail at drawing 3 .

[0033] The slip ring 40 is attached in the rise-and-fall plate 17 free [a revolution] through bearing, and it is arranged in the surroundings of the shank material 10 so that it may be illustrated.

[0034] This slip ring 40 is an annular member as shown in drawing 4 , and is equipped with the periphery side flow ring 41 arranged along with the peripheral face, and the inner circumference side flow ring 42 arranged along with

inner skin. these periphery side flow ring 41 and the inner circumference side flow ring 42 -- connection -- it connects electrically through the conductor 43. Moreover, in a periphery, the periphery side flow ring 41 contacts free [sliding of the periphery side brush 44], and is connected to the power source which is not illustrated through the wiring 45 with which it begins to extend from this periphery side brush 44. On the other hand, the inner circumference side flow ring 42 is connected to wiring 47 through the inner circumference side brush 46 in contact with inner skin. This wiring 47 is connected to Motors 16A and 16B through centrum 10b of the shank material 10. Power is supplied to Motors 16A and 16B from a power source by such configuration, without complicating the configuration of coil equipment.

[0035] Moreover, this slip ring 40 is connected with a flyer 3 through the pulleys 52 and 53 and belts 54 and 55 which were arranged by the revolving shaft 51, and rotates synchronizing with a flyer 3. In this case, since the surroundings of the shank material 10 are revolved around the sun when the slip ring 40 rotates, since a wire rod 7 is led through the gangway 48 which penetrates the slip ring 40 up and down, it does not interfere in a wire rod 7 in wiring 47.

[0036] Below, according to drawing 5 - drawing 12 , the coil procedure by the coil equipment of the gestalt of this operation is explained.

[0037] As shown in drawing 5 , the wire rod 7 which it let out from wire rod delivery section 3a of a flyer 3 is grasped by the wire rod grasping device 9 in an edge. The path of the winding frame formed in this condition by the winding frame pins 14A, 15A, 14B, and 15B of the winding frame device 11 is wound around the surroundings of the winding frame pins 14A, 15A, 14B, and 15B of the winding frame device 11 by setting it as a predetermined path and rotating a flyer 3 according to the configuration of a stator 34. In this case, the sequential-sorting volume is made in the predetermined location of the winding frame pins 14A, 15A, 14B, and 15B by shifting the location of the winding frame pins 14A, 15A, 14B, and 15B which face wire rod delivery section 3a by rise and fall of the rise-and-fall plate 17.

[0038] Thus, after one bundle of predetermined coil coil (coil of predetermined number of turns) is completed, as shown in drawing 6 , by narrowing spacing of the migration plates 13A and 13B by actuation of Motors 16A and 16B, a wire rod 7 is slid down from the surroundings of the winding frame pins 14A, 15A, 14B, and 15B, and a wire rod 7 is rolled over in the predetermined location of a blade 23.

[0039] Then, making small the diameter of a winding frame of the winding frame device 11 one by one by migration of the migration plates 13A and 13B to the suitable magnitude decided by the configuration of a stator 34, the same procedure performs a coil and the wire rod 7 by which the coil was carried out to the winding frame device 11 is rolled over to the blade 23 one by one. Thereby, as a wound diameter becomes small, the wire rod 7 by which the coil was carried out will be in the condition that two or more layer (gestalt of this operation three layers) laminating was carried out at a blade 23, so that it goes to the upper layer. The coil of the lowest layer turns into a coil of a major diameter hung about ranging over five needles of a blade 23 in detail, an interlayer's coil turns into a coil of a path, while being hung about ranging over three needles, and the coil of the lowest layer turns into a coil of a minor diameter hung about on one needle.

[0040] In addition, although it is made to change the diameter of a winding frame for every coil of coil each class with the gestalt of this operation in this way, this invention can also take a gestalt which is not restricted to such a gestalt, and changes the diameter of a winding frame in the middle of the coil of coil each class, for example, changes a coil diameter finely within coil each class.

[0041] thus, when the coil of a wire rod and dropping [wind] are completed, as shown in drawing 8 , the predetermined include-angle (for example, 90 degrees) revolution of the base 22 of the blade device 20 is carried out, and a blade 23 is new -- it rolls over and a location is arranged under the winding frame device 11. [which should be rolled over in the predetermined location of a blade 23] a blade 23 is new a coil and by rolling over and changing the wound diameter one by one in the procedure same in this condition as the above -- it rolls over and the wire rod 7 is rolled over in the state of the laminating in the location.

[0042] If a wire rod 7 is rolled over over the perimeter of a blade 23 by the repeat of such a procedure as shown in drawing 9 , the blade device 20 will be moved under the coil insertion child's 31 upper part, and the stator supporter 32. The coil insertion child 31 is made to rise from between the annular holes of a base 22 in this condition.

[0043] Thereby, as shown in drawing 10 and drawing 11 , the wire rod 7 currently rolled over by the blade 23 is pushed up by the coil insertion child 31 from a blade 23, and is pushed in the stator 34 interior supported by the stator supporter 32.

[0044] In this case, since the path of each class of the wire rod 7 currently rolled over by the blade 23 is adjusted to the magnitude which corresponded to the applied part of a stator 34 surely as mentioned above, it is made smooth

and it goes to each slot 35 of a stator 34. When equipping with the wire rod 7 (coil) by which the coil was carried out to the stator 34 as shown, for example in drawing 12 if it explains concretely, 1st layer (the maximum upper layer) 7a of a coil is inserted in the adjacent slots 35a and 35b. Although 2nd layer (interlayer) 7b of a coil is inserted in the slots 35c and 35d of the both sides of Slots 35a and 35b and 3rd layer (lowest layer) 7c of a coil is inserted in the slots 35e and 35f of Slots [35c and 35d] both sides The coil of each class 7a, 7b, and 7c of a coil is carried out beforehand at the path equivalent to slot 35a, 35b and 35c, and spacing (35d, 35e, and 35f), and wearing of the wire rod 7 to a stator 34 is performed very smoothly.

[0045] Moreover, since each class 7a, 7b, and 7c of the coil with which it was equipped does not overlap, its space factor of the completed coil improves. Moreover, the useless part of each class 7a, 7b, and 7c of a coil is lost in a coil, and its coil property (property of the motor using the completed coil) improves while molding of a coil and the section becomes easy, since the slot 35 of a stator 34 is equipped exactly and a stator 34 does not project [the excessive wire rod 7] up and down.

[0046] Thus, if wearing of the wire rod 7 to a stator 34 is completed, the coil insertion child 31 will be dropped and a coil activity will be completed.

[0047] As mentioned above, since according to the coil equipment of this invention the diameter of a winding frame of the winding frame device 11 can be adjusted continuously and the wound diameter of a coil can be appropriately changed according to the configuration of a stator 34, the coil rolled over by the blade 23 is inserted smoothly [there is no futility in a stator 34 and], and can manufacture the good big coil of a space factor.

[0048] Moreover, since the wound diameter of a coil can be continuously changed freely by modification of the diameter of a winding frame of the winding-machine style 11, it can respond to modification of the configuration of a stator 34, or specification modification of a coil easily.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the coil equipment in which the gestalt of operation of this invention is shown.

[Drawing 2] Similarly it is a sectional view.

[Drawing 3] Similarly it is a sectional view a part.

[Drawing 4] It is the perspective view showing the slip ring similarly.

[Drawing 5] It is the explanatory view showing a coil procedure similarly.

[Drawing 6] It is the explanatory view showing a coil procedure similarly.

[Drawing 7] It is the explanatory view showing a coil procedure similarly.

[Drawing 8] It is the explanatory view showing a coil procedure similarly.

[Drawing 9] It is the explanatory view showing a coil procedure similarly.

[Drawing 10] It is the explanatory view showing a coil procedure similarly.

[Drawing 11] It is the explanatory view showing a coil procedure similarly.

[Drawing 12] It is the explanatory view showing a coil procedure similarly.

[Description of Notations]

3 Flyer

7 Wire Rod

10 Shank Material

11 Winding Frame Device

12 Advice Shaft

13A, 13B Migration plate

14A, 14B Winding frame pin

15A, 15B Winding frame pin

16A, 16B Motor

20 Blade Device

21 Susceptor

22 Base

23 Blade

26 Motor

27 Rail

31 Coil Insertion Child

34 Stator

35 Slot

40 Slip Ring

47 Wiring

[Translation done.]

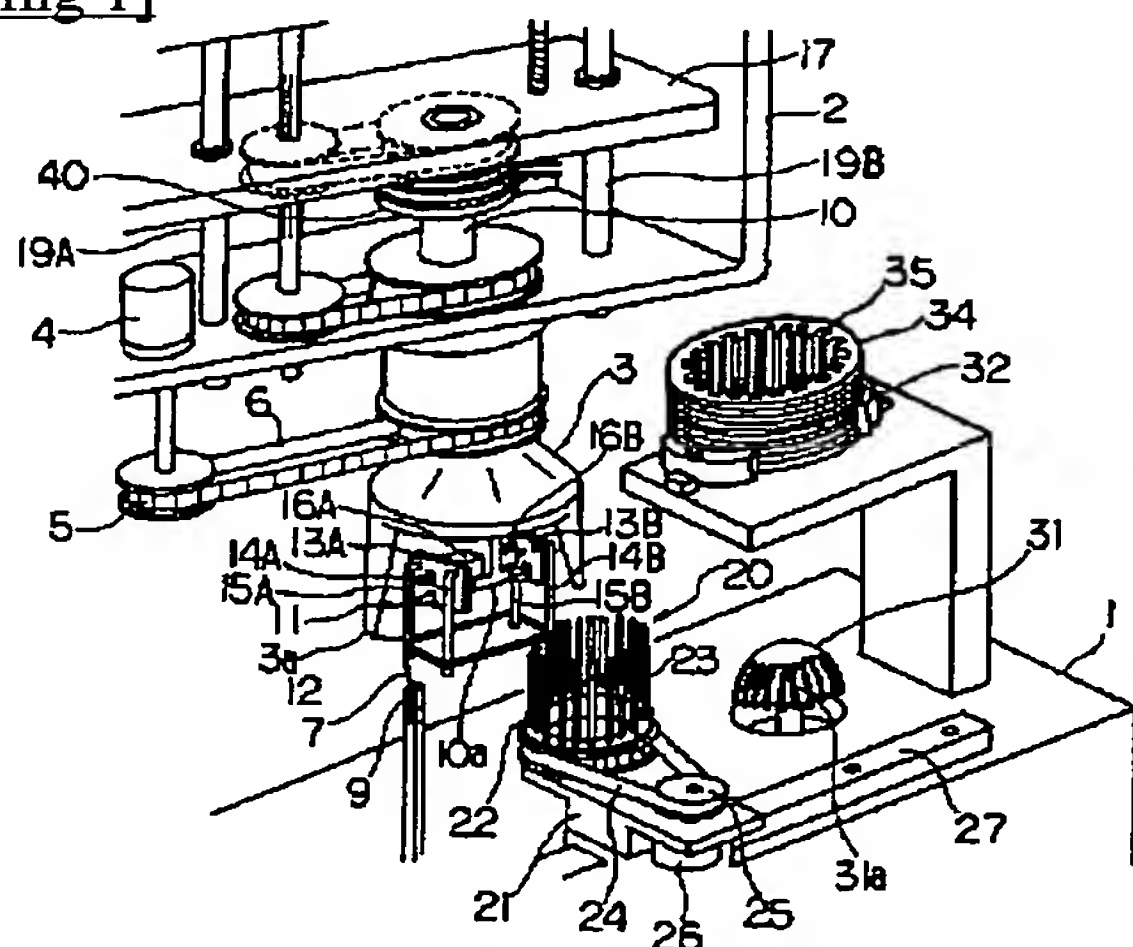
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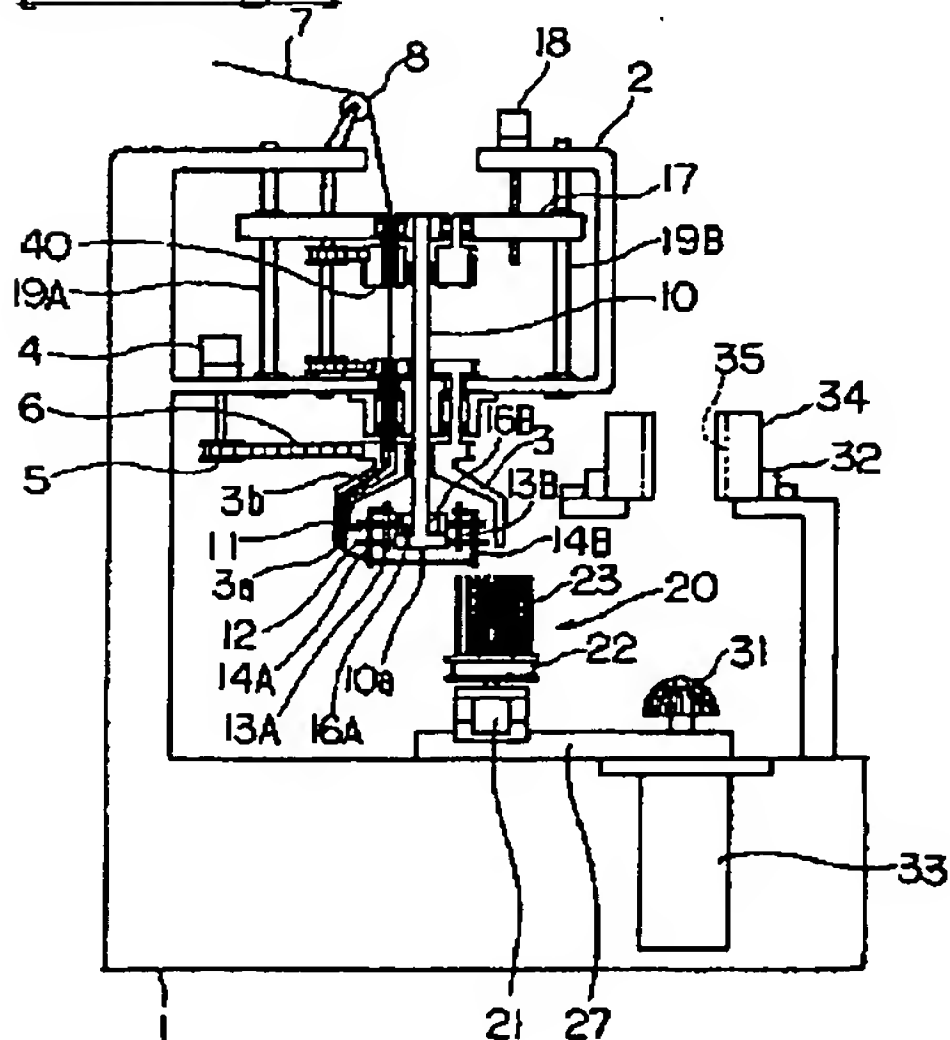
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DRAWINGS

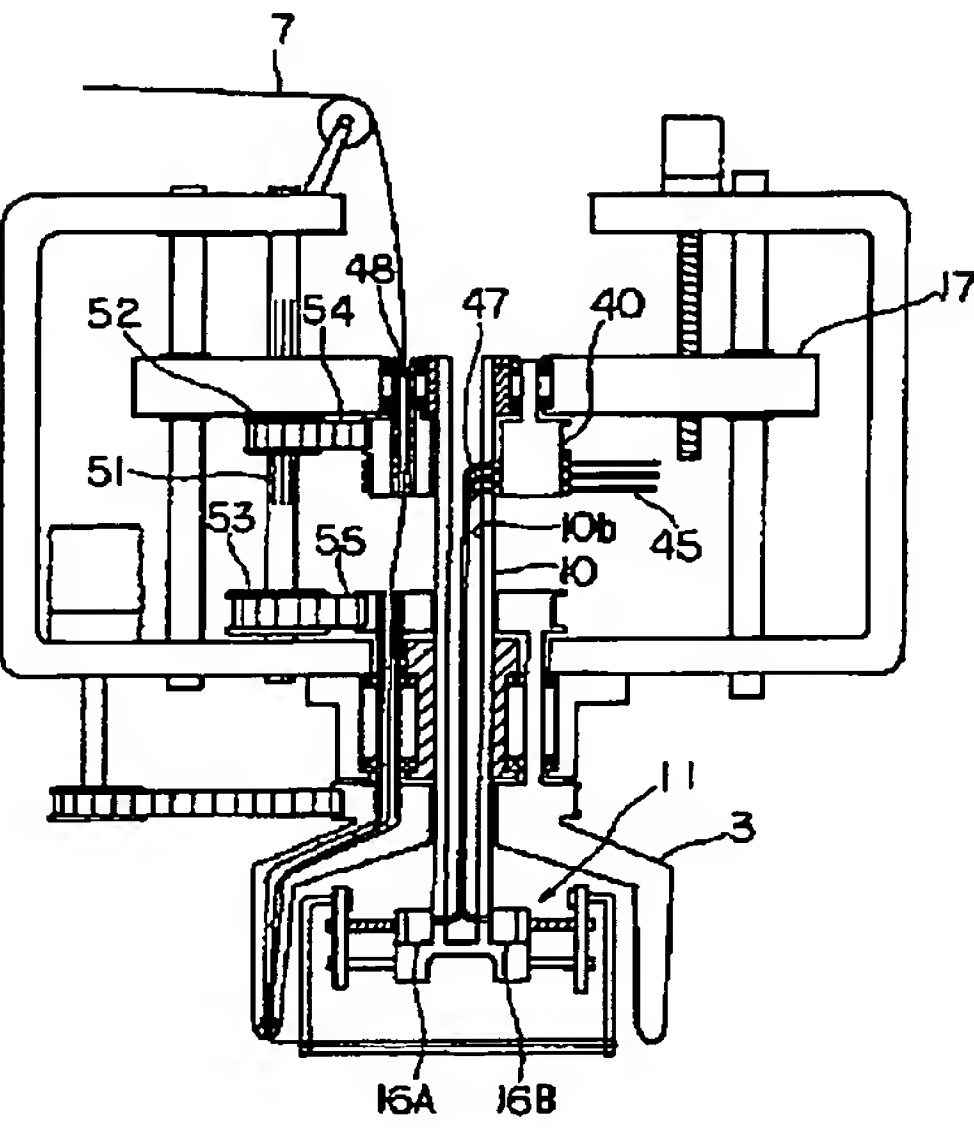
[Drawing 1]



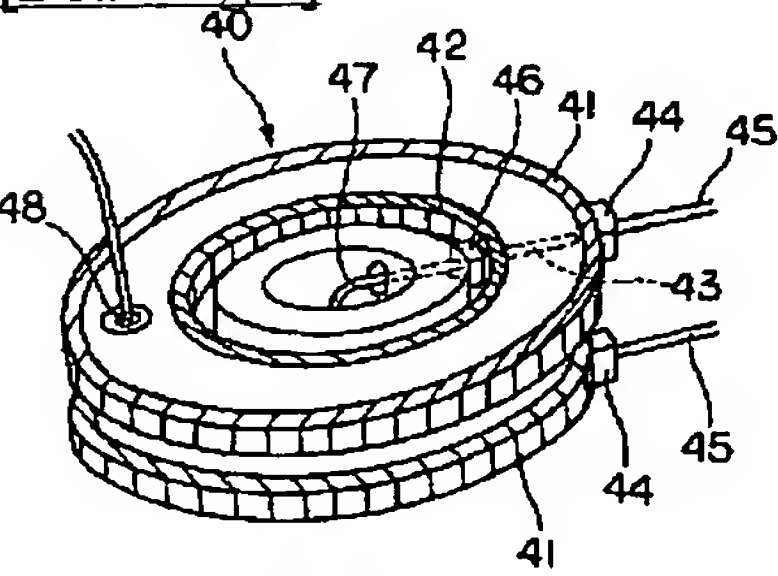
[Drawing 2]



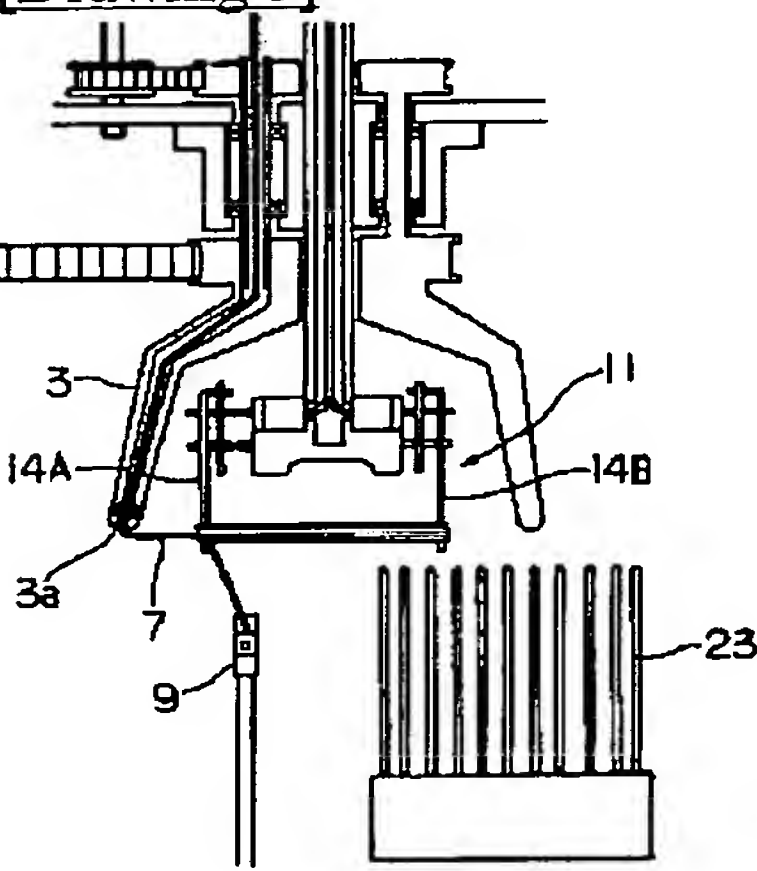
[Drawing 3]



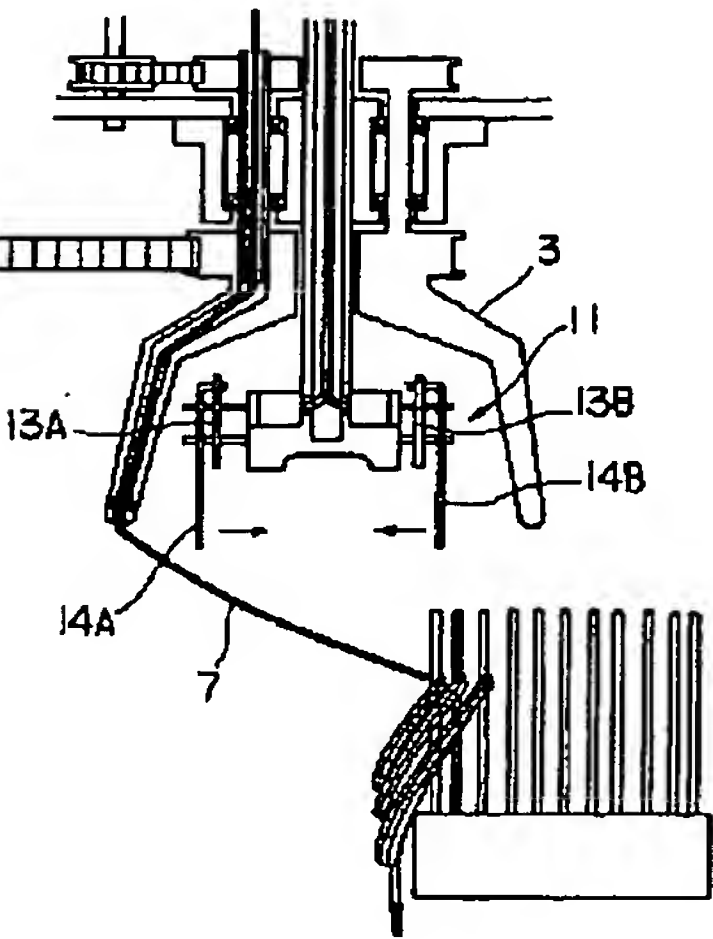
[Drawing 4]



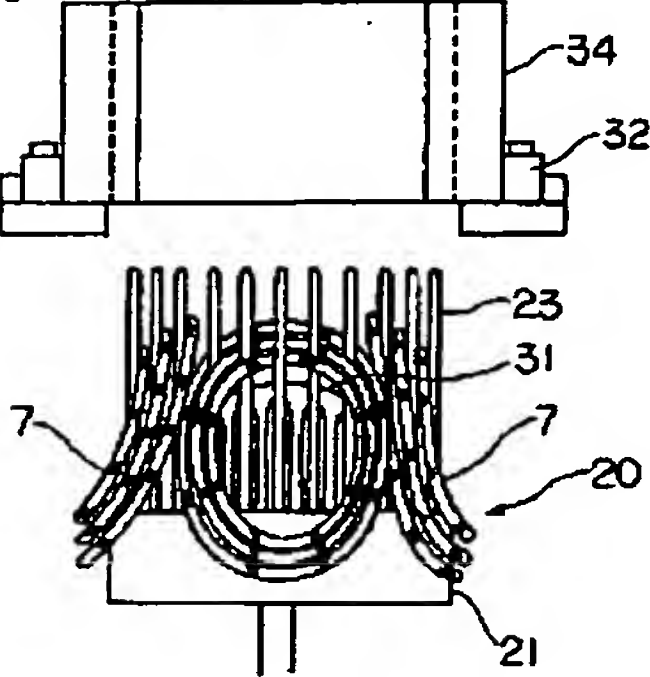
[Drawing 5]



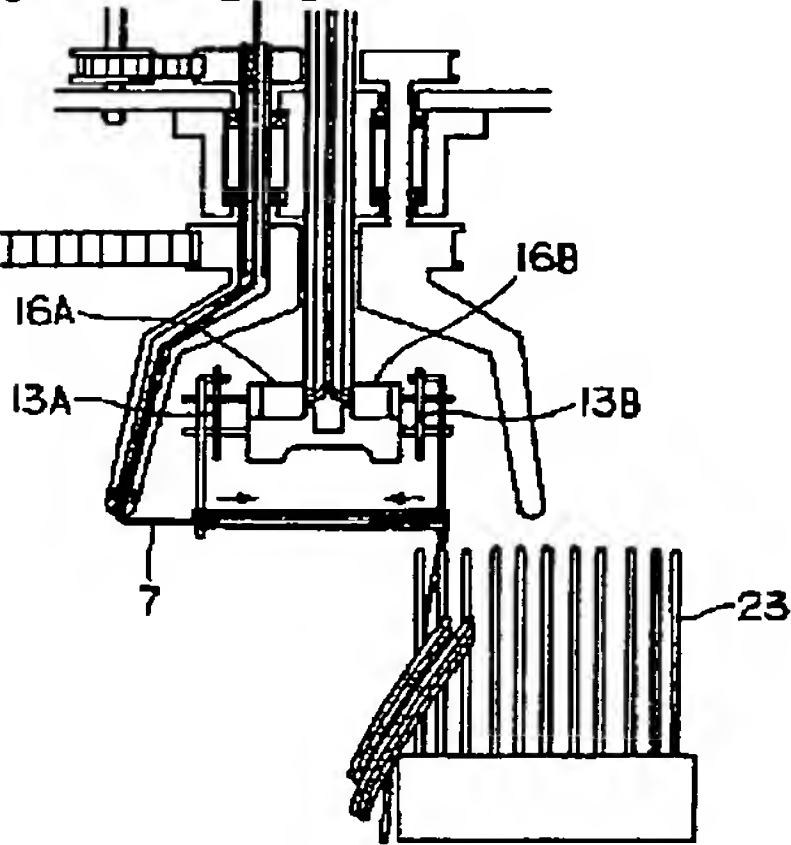
[Drawing 7]



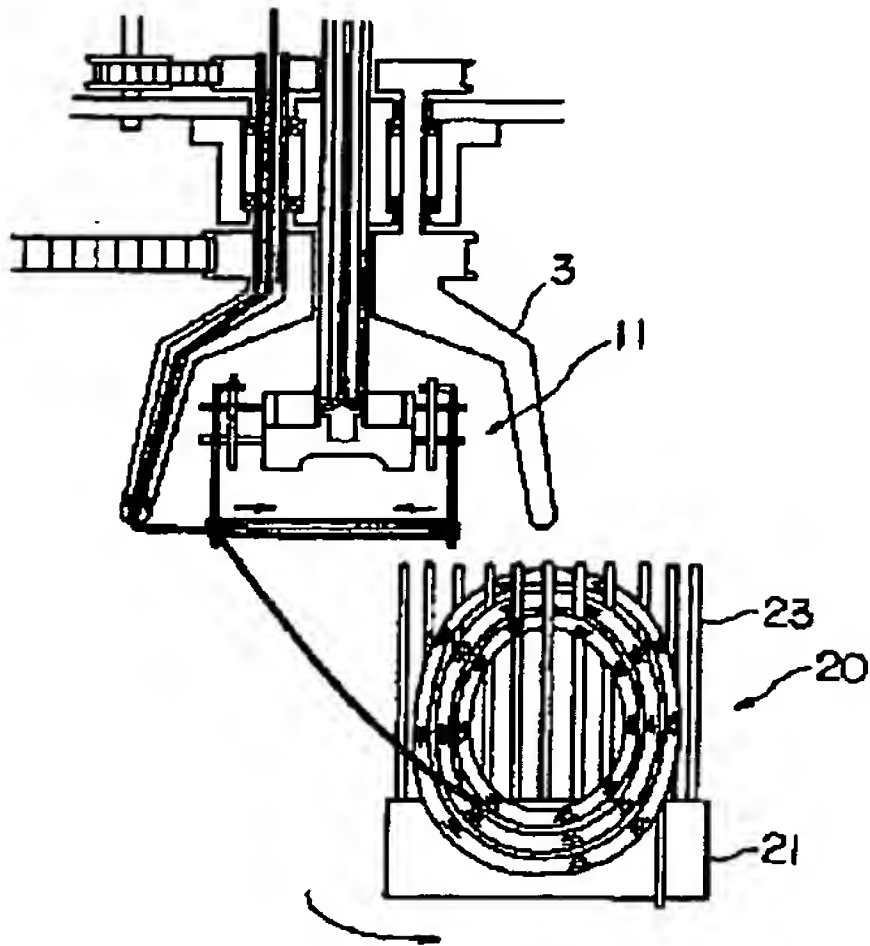
[Drawing 9]



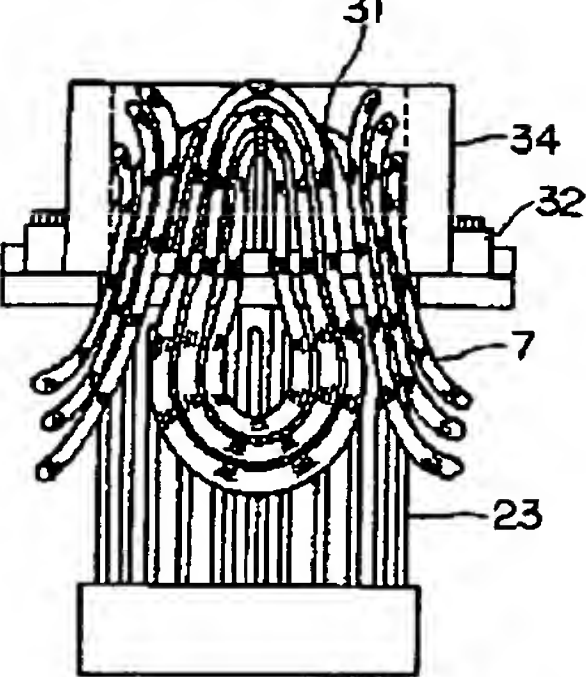
[Drawing 6]



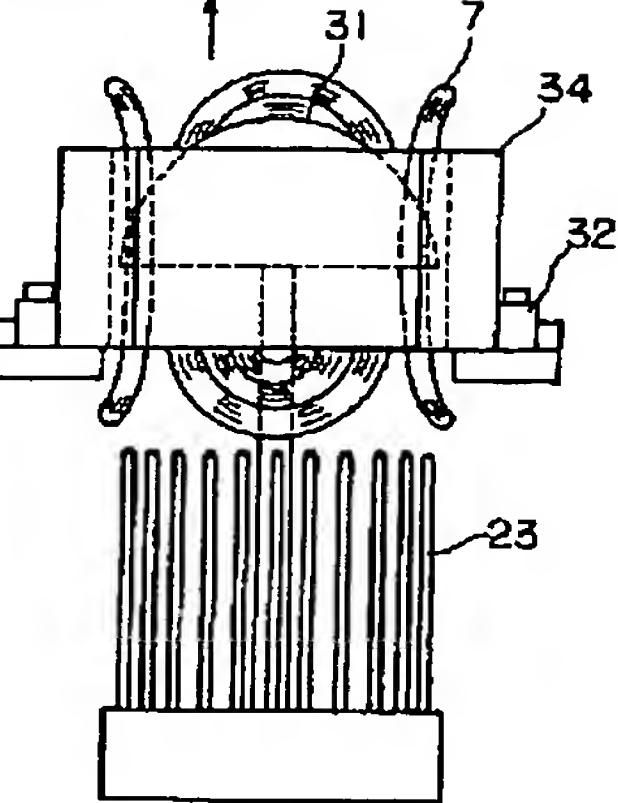
[Drawing 8]



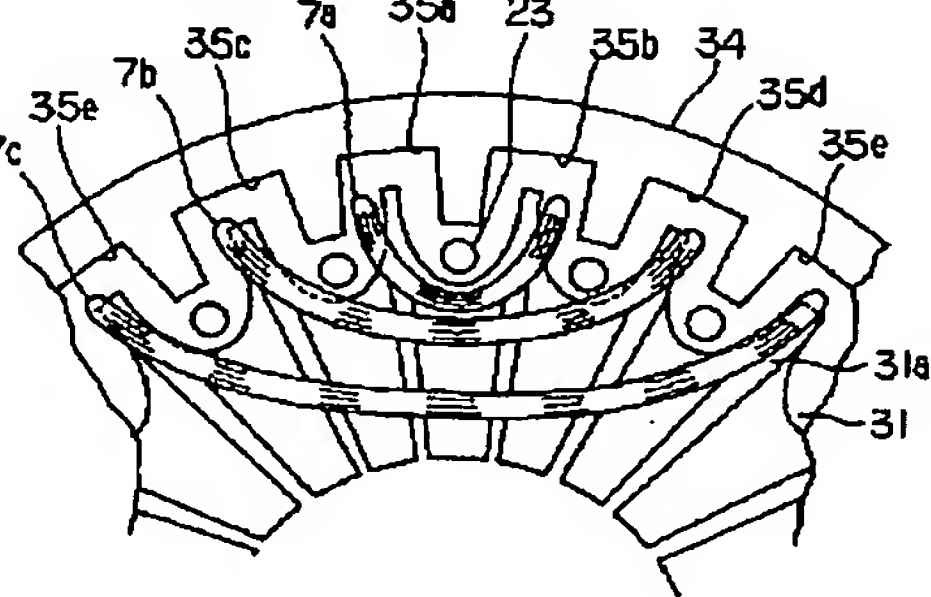
[Drawing 10]



[Drawing 11]



[Drawing 12]



[Translation done.]